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IS 8872-4-1 (1980): Variable Resistors, Part 4: Preset, Section 1: Type VRT 1 [LITD 5: Semiconductor and Other Electronic Components and Devices]

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(Reaffirmed 2002)

Indian Standard

SPECIFICATION FOR VARIABLE RESISTORS

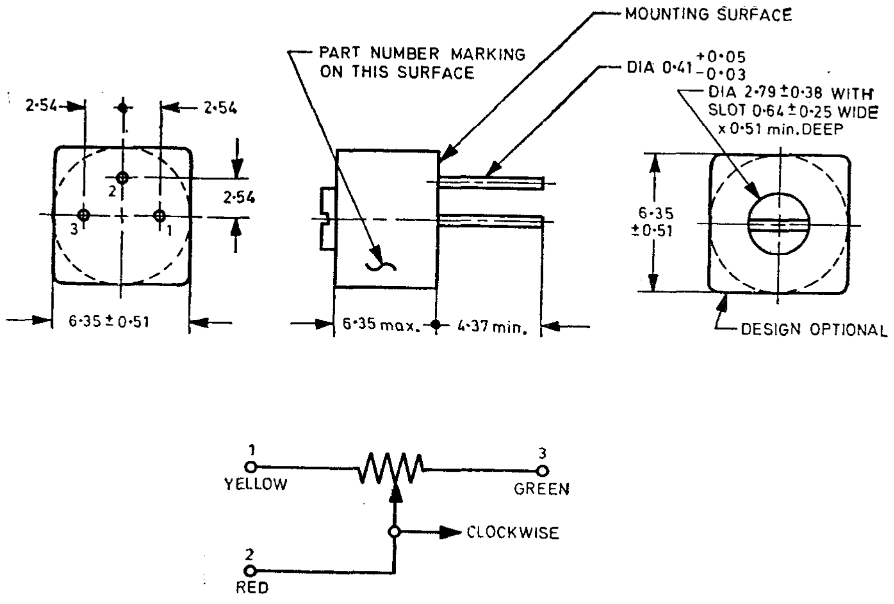
PART IV PRESET

Section 1 Type VRT 1

Resistors Sectional Committee, LTDC 14 [Ref: Doc: LTDC 14(277)]

0. General — This standard shall be read in conjunction with IS : 8872 (Part I)-1977 'Specification for variable resistors: Part I General requirements and methods of tests'.

1. Outline Drawing and Dimensions — The outline drawing and dimensions shall be according to Fig. 1 and 2.



CIRCUIT DIAGRAM

Note 1 — Dimensions are in millimetres.

Note 2 — Unless otherwise specified, tolerance is ±0·13.

Note 3 — Nominal mounting means is by the use of pins only.

Note 4 — The picturization of the style above is given as representative of the envelope of the item. Slight deviations from the outline shown, which are contained within the envelope, and do not alter the functional aspects of the device are acceptable.

Note 5 — The head of the actuating screw may or may not be flush with or recessed in the body.

FIG. 1 OUTLINE DRAWING AND DIMENSIONS (STYLE VRT 1-0·25)

Adopted 7 July 1980

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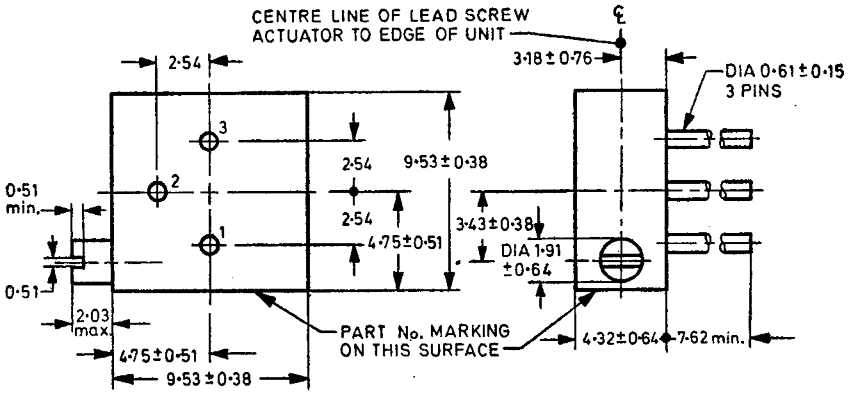
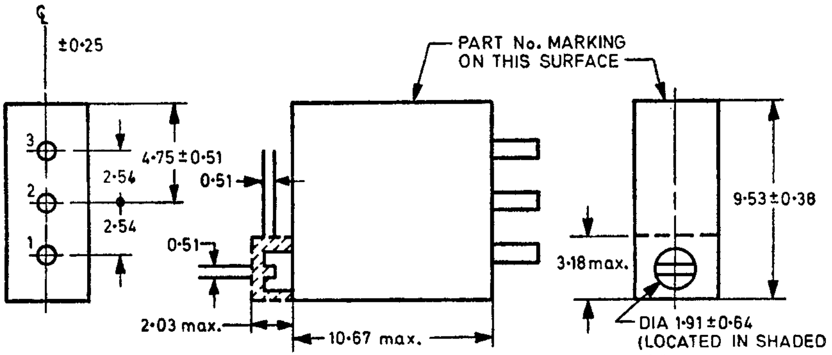
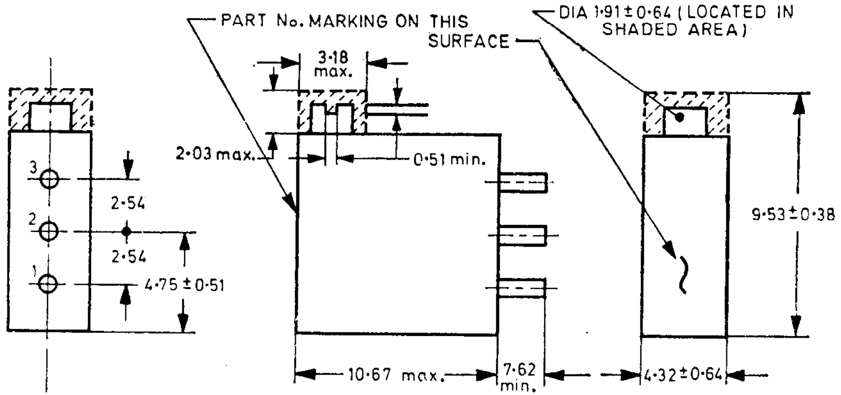


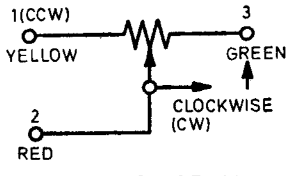
TERMINAL TYPE P



TERMINAL TYPE W



TERMINAL TYPE X



CIRCUIT DIAGRAM

Note 1 — All dimensions are in millimetres.

Note 2 — Unless otherwise specified, tolerance is ±0·13.

Note 3 — The picturization of the styles above are given as representative of the envelope of the item. Slight deviations from the outline shown, which are contained within the envelope, and do not alter the functional aspects of the devices are acceptable.

Note 4 — The entire slot of the actuating screw shall be above the surface of the unit.

Note 5 — For the above terminal types, normal mounting means is by use of pins only.

FIG. 2 OUTLINE DRAWING AND DIMENSIONS (STYLE VRT 1-0·5)

2. Ratings — Ratings shall be as specified in Table 1.

Note — For ratings at temperatures other than 85°C, reference shall be made to the derating curve shown in **4.**

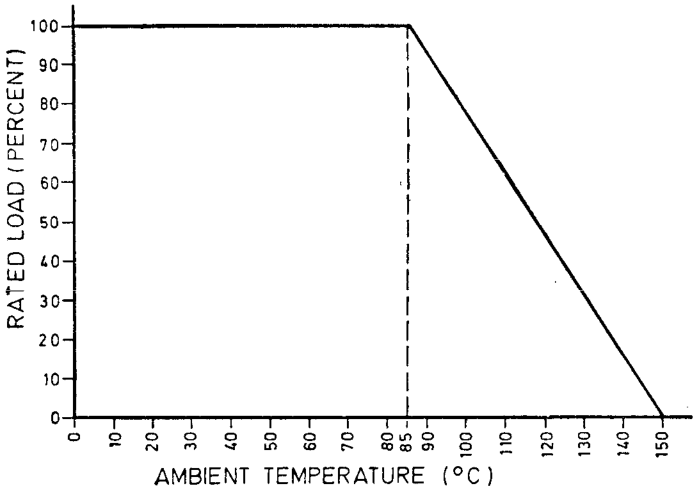
TABLE 1 DIMENSIONS AND RATINGS

Style	Rated Dissipation at (W at 85°C)	Figure Reference	Operating Torque (m.Nm)	Resistance Range
(1)	(2)	(3)	(4)	(5)
VRT 1-0·25	0·25	1	14·1	10 Ω to 1 M Ω
VRT 1-0·5	0·5	2	35·5	10 Ω to 1 M Ω

3. Characteristics

a) Climatic category	55/150/56
b) Low air pressure	4·4 kPa
c) Acceleration	1 km/s^2
d) Bump	4 000 bumps
e) Vibration	10 to 2 000 Hz, 200 m/s^2
f) Shock	1 km/s^2
g) Resistance range	*See* Table 1
h) Selection tolerance	±10 percent
j) Rated dissipation at 85°C	*See* Table 1
k) Temperature characteristic of resistance	±100 ppm/°C
m) Stability after endurance electrical	±2 percent
n) Maximum surface temperature	150°C
p) Typical construction	Cerment, non-wirewound

4. Derating Curve



5. Marking — *See* **6** of IS : 8872 (Part I)-1977.

6. Material, Construction and Workmanship — *See* **5** of IS : 8872 (Part I)-1977.

7. Tests

7.1 *Classification of Tests*

7.1.1 *Type tests*—The sequence of type tests and requirements shall be in accordance with the Table 3.

7.1.1.1 *Number of samples* — The manufacturers shall submit 48 samples in each style for which the approval is required, having the numbers and values as follows:

a) 16 samples of the highest value, including 2 spares;

b) 16 samples of the lowest value, including 2 spares; and

c) 16 samples of the middle value, including 2 spares.

7.1.2 *Routine tests* — The following shall constitute the routine tests and shall be carried out on each and every resistor:

a) Visual examination,

b) Continuity,

c) Element resistance, and

d) Sealing.

7.1.3 *Acceptance tests* — For the purpose of the acceptance of the lot, all samples shall be subjected to the tests as given in **7.1.2**. The following two groups of samples (Group A and B) shall be drawn and the resistors in each group shall be subjected to the tests as specified in the Table 2.

TABLE 2 SCHEDULE OF ACCEPTANCE TESTS

Sl No.	Tests	AQL (Percent Defective)	Inspection Level	D/ND
(1)	(2)	(3)	(4)	(5)
1.	*Group A*			
	Dimensions Resistance law Voltage-proof (2 seconds) Operating torque Contact resistance variation	1	II	ND
2.	*Group B*			
	Sub-group B1 Solderability	4	S-3	D
	Sub-group B2 Resistance to soldering heat Robustness of terminations Endurance (mechanical) End stop torque	4	S-3	D
	Sub-group B3 Vibration climatic Climatic	4	S-3	D
	Sub-group B4 Endurance (electrical) (168 hours)	4	S-3	ND

D = Destructive, ND = Non-destructive.

7.2 *General Conditions for Tests — See* **7** of IS : 8872 (Part I)-1977.

7.2.1 The test schedule and the requirements shall be in accordance with Table 3.

TABLE 3 TEST SCHEDULE AND REQUIREMENTS

Sl No.	Test	Clause Ref in IS: 8872 (Part I)-1977	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
I)	*O Group* (48 samples)			
	a) Visual examination	9.1	—	The condition, workmanship and finish shall be satisfactory. Marking shall be legible and indelible
	b) Dimensions	9.1.1	—	Dimensions shall be as in Fig. 1 and 2
	c) Element resistance	8.2	—	Within the selection tolerance ±10 percent
	d) Terminal resistance	8.3	—	The end resistance at either end of the resistor shall not exceed 20 Ω or ± 2 percent of the total resistance value whichever is greater
	e) Minimum effective resistance and angle of 8·5 ineffective rotation	8.5	—	The resistance value at angular positions are recorded for information only
	f) Angle of ineffective rotation (from termination 'a')	8.5.1	This is the angle between the two positions recorded above	—
	g) Value of minimum effective resistance (from termination 'a')	8.5.1	This is the resistance value as measured above	—
	h) Angle of effective rotation and value of minimum effective resistance (from termination '*C*')	8.5.2	—	The resistance value at angular positions are recorded for information only
	j) Effective resistance and angle of effective rotation	8.6	—	The angle of effective rotation shall be: a) for style VRT 1-0·25: 215° *Min* b) for style VRT 1-0·5: 15 Turns, *Min* 50 Turns, *Max*
	k) Voltage-proof	8.9	600 V rms for one minute for style VRT 1-0·25 and 900 V rms for one minute for style VRT 1-0·5	No breakdown or flash-over
	m) Insulation resistance	8.10	—	The value shall be not less than 1 000 M Ω
	n) Operating torque	9.2	The operating torque required to operate the contact arms at approximately 10, 50 and 90 percent of the actual effective electrical travel shall be determined.	The value shall be as given in Table 1

(Continued)

TABLE 3 TEST SCHEDULE AND REQUIREMENTS—*Contd*

Sl No.	Test	Clause Ref in IS: 8872 (Part I)-1977	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
	p) End-stop torque	9.4	Applicable to only style VRT 1-0·25. The torque to be applied shall be 28·2 m.Nm	There shall be no deformation or mechanical damage
	q) Clutch operation	9.4.2	—	The contact arms shall idle against the stop without electrical discontinuity or evidence of mechanical damage. The travel of the contact arm shall also be capable of reversing direction
	r) Sealing	11.5	—	No bubbling shall occur
	s) Contact resistance variation	8.12.4	Number of cycles: 6	The contact resistance variation shall not exceed 3 percent or 3 Ω whichever is greater
II)	*First Group* (12 samples)			
	a) Solderability	9.8.3	—	As in IS: 8872 (Part I)-1977
	b) Robustness of terminations	9.7	Tensile: 10 N Bending: 1 Bend to be bent through 90°	As in IS: 8872 (Part I)-1977
	c) Bump*	9.10	4 000 Bumps	
	1) Setting stability	—	—	The change shall not exceed 1 percent
	2) Element resistance	8.2	—	The change in the resistance from the initial value shall not exceed ± (1 percent + 0·05Ω)
	3) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	d) Vibration*	9.9	10 to 2 000 Hz, 200 m/s^2	
	1) Setting stability	—	—	The change shall not exceed 1 percent
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± (1 percent + 0·05 Ω)
	e) Shock*	9.11	1 km/s^2	
	1) Setting stability	—	—	The change shall not exceed 1 percent
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± (1 percent +0·05 Ω)
	3) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	f) Acceleration*	9.12	1 km/s^2	
	1) Setting stability	—	—	The change shall not exceed 1 percent
	2) Element Resistance	8.2	—	The change in resistance from the initial value shall not exceed ± (1 percent + 0·05 Ω)

*Throughout the test, the resistors shall be connected to a suitable monitoring device to determine electrical discontinuity. It is desirable that the detecting equipment shall detect any interruption with a duration of 0.1 millisecond or greater.

(Continued)

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS: 8872 (Part I)-1977	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
	3) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	g) Rapid change of temperature	10.5	55/150	
	1) Setting stability	—	—	The change shall not exceed 1 percent
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± 1 percent
	h) Climatic tests	10	—	—
	1) Dry heat	10.1.2	At + 150°C	—
	2) Damp heat (accelerated)	10.1.3	One cycle	—
	3) Cold test	10.1.4	At − 55°C	—
	4) Operating torque	9.2	—	The value shall not exceed 1·5 times the maximum value specified in Sl No. (*I*) (n)
	5) Low air pressure	10.1.5	4·4 kPa. During the last 5 minutes of the test the specimen shall be loaded 50 percent of the rated dissipation subject to the low air pressure voltage limitation	—
	6) Damp heat (accelerated) remaining cycles	10.1.6	—	—
	i) Visual examination	9.1	—	There shall be no corrosion, fracture, loosening of parts of other mechanical damage. Marking shall be legible and indelible
	ii) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed 2 percent
	iii) Insulation resistance	8.10	—	The value shall be not less than 100 M Ω
	iv) Voltage-proof	8.9	—	No breakdown or flash-over
III)	*Second Group* (6 samples)			
	a) Damp heat (long term)	10.2	—	—
	1) Visual examination	9.1	—	There shall be no corrosion, fracture, loosening of parts of other mechanical damage. The marking shall be legible and indelible
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± 2 percent
	3) Insulation resistance	8.10	—	The value shall be not less than 100 M Ω
	4) Voltage-proof	8.9	—	No breakdown or flash-over
	5) Solderability	9.8.3	—	As in Sl No. II (a)

(*Continued*)

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause No. in IS: 8872 (Part I)-1977	Condition of Test	Requirements
(1)	(2)	(3)	(4)	(5)
IV)	*Third Group* (6 samples)			
	a) Endurance (mechanical)	11.3	200 cycles. 1 cycle in 2 ± 0·5 minutes	—
	1) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical damage
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± 2 percent
V)	*Fourth Group* (6 samples)			
	a) Endurance (electrical)	11.4	At + 85°C	—
	1) Visual examination	9.1	—	There shall be no fracture, or any other mechanical damage. Marking shall be legible and indelible
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± 2 percent
	3) Insulation resistance	8.10	—	As in Sl No. I (m)
	4) Voltage-proof	8.9	—	No breakdown or flash-over
	5) Setting stability	—	—	The change shall not exceed 1 percent
	b) Flammability	11.2	—	—
VI)	*Fifth Group* (3 samples)			
	a) Mould growth	10.4	—	As in IS: 8872 (Part I)-1977
VII)	*Sixth Group* (3 samples)			
	a) Resistance to solvents	11.1	—	—
	b) Resistance to soldering heat	9.8.4	—	—
	1) Visual examination	9.1	—	There shall be no fracture, loosening of parts or other mechanical deterioration
	2) Element resistance	8.2	—	The change in resistance from the initial value shall not exceed ± (1 percent + 0·05 Ω)
VIII)	*Seventh Group* (6 sampels)			
	a) Temperature characteristic of resistance	8.11	The temperature condition(s) shall be 85°C	The value shall be ± 100 ppm/°C
	b) Salt mist	10.3	—	—
	1) Visual examination	9.1	—	There shall be no corrosion, loosening of parts or other mechanical deterioration. The marking shall be legible and indelible
	2) Element resistance	8.2	—	As in Sl No. I (c)
	3) Operating torque	9.2	—	As in Sl No. I (n)
IX)	*Spares* (6 samples)			

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